

Sigeru DAIGOBO*: Chromosome numbers of the
fern genus *Polystichum* (2)**

大悟法 濟*: イノデ属の染色体数 (2)**

As a continuation of the previous paper (Daigobo, 1973), the chromosome numbers in 19 natural hybrids of *Polystichum* will be reported in this paper; confirmations in two hybrids and initial counts in 17 hybrids. Materials employed and the gametic chromosome numbers counted are listed in Table 1. Chromosome counts were made with the usual aceto-carmine squash method.

On the basis of irregular meiotic behaviour showing univalents, the hybridity of each natural hybrids presumed by the morphology is also supported cytologically.

Eight natural hybrids, *P. × hakonense*, *P. × izuense*, *P. × kiyozumianum*, *P. × kunioi*, *P. × kurokawae*, *P. × mashikoi*, *P. × ongataense* and *P. × namegatae*, can be considered to be tetraploid hybrids, because of the chromosome pairings at meiosis which indicate the generic relationships between the tetraploid parental species. Putative parents proposed by Kurata (1964, 1969) seem to be also supported by chromosome numbers of these hybrids yielded by the present study.

Eleven natural hybrids, *P. × amboversum*, *P. × hitoyoshiense*, *P. × hokuri-kuense*, *P. × inadae*, *P. × jitarii*, *P. × kumamontanum*, *P. × miuranum*, *P. × ohtanii*, *P. × shintashiroi*, *P. × suginoi* and *P. × utsumii*, seem to be triploid hybrids, for they show approximately 30–80 univalents and 20–45 bivalents at meiosis and 123 in total chromosome number.

Polystichum × amboversum was proposed by Kurata (1964) for a fern considered to be a hybrid between *P. retrosopaleaceum* ($n=41$) and *P. ovatopaleaceum* ($n=82$). Although the specimen used for this study is apparently a triploid plant, showing 123 chromosomes at meiosis, it can be considered to be a natural hybrid between *P. retrosopaleaceum* and *P. ovato-*

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Table 1. Chromosome numbers of hybrids in the genus *Polystichum*. Hybrids marked with an asterisk are cultivated in Koishikawa Botanical Garden of University of Tokyo.

Hybrids	Locality	Chromosome number			Fig.
		Univalent	Bivalent	Total	
<i>P. × amboversum</i>	Okukinu, Totigi Pref.	40-43	40-41	123	1
<i>P. × hakonense</i>	Hakone, Kanagawa Pref.*	60	52	164	2
<i>P. × hitoyoshiense</i>	Hitoyosi, Kumamoto Pref.*	38-41	40-41	123	3
<i>P. × hokurikuense</i>	Gotenba, Sizuoka Pref.*	79-81	21-22	123	4
<i>P. × inadae</i>	Takehu, Hukui Pref.*	33	45	123	5
<i>P. × izuense</i>	Mituisi, Tiba Pref.	38	63	164	6
<i>P. × jitari</i>	Kiyosumi, Tiba Pref.*	61-63	30-31	123	7
<i>P. × kiyozumiianum</i>	Kiyosumi, Tiba Pref.*	52	56	164	8
<i>P. × kumamontanum</i>	Tetuyama, Miyazaki Pref.	45-47	38-39	123	9
<i>P. × kunioi</i>	Kasayama, Yamaguti Pref.*	70	47	164	10
<i>P. × kurokawae</i>	Takao, Tokyo Pref.	46-64	50-59	164	11
<i>P. × mashikoi</i>	Amagi, Sizuoka Pref.*	60-62	51-52	164	12
<i>P. × miuranum</i>	Taura, Kanagawa Pref.	40-41	40-41	123	13
<i>P. × ohtanii</i>	Taura, Kanagawa Pref.*	47-53	35-38	123	14
<i>P. × ongataense</i>	Tutiyosawa, Tokyo Pref.	64	50	164	15
<i>P. × namegatae</i>	Mituisi, Tiba Pref.	54-55	50-55	164	16
<i>P. × shintashiroi</i>	Myoko, Niigata Pref.*	59	32	123	17
<i>P. × suginoi</i>	Hitoyosi, Kumamoto Pref.*	39-59	32-42	123	18
<i>P. × utsumii</i>	Hunakosi, Hyogo Pref.*	59-75	24-32	123	19

paleaceum "var. *coraiense*" mainly by morphological character having oblong-ovate scales on stipe.

Polystichum × inadae was reported by Kurata (1960) as a hybrid between *P. polyblepharum* ($n=82$) and *P. retrosopaleaceum* ($n=41$). It can be also considered to be a hybrid between *P. polyblepharum* ($n=82$) and *P. ovatopaleaceum* ($n=82$) as pointed out by Kurata (1964). The specimen used in this study may be a hybrid between *P. polyblepharum* and *P. retrosopaleaceum* at least judging from the results yielded here, since it shows 33 univalents and 45 bivalents and total chromosome number is 123.

Polystichum × jitari was proposed by Kurata (1964) for a hybrid between *P. polyblepharum* ($n=82$) and *P. pseudomakinoi* ($n=82$). The material from near the type locality shows approximately 60 univalents and 30 bivalents at meiosis, and total chromosome number was 123. From these cytological features and morphological character having large linear-lanceolate scales on stipe, *P. × jitari* seems to be a hybrid between *P. fibrillosopaleaceum* ($n=41$) and *P. pseudomakinoi* ($n=82$).

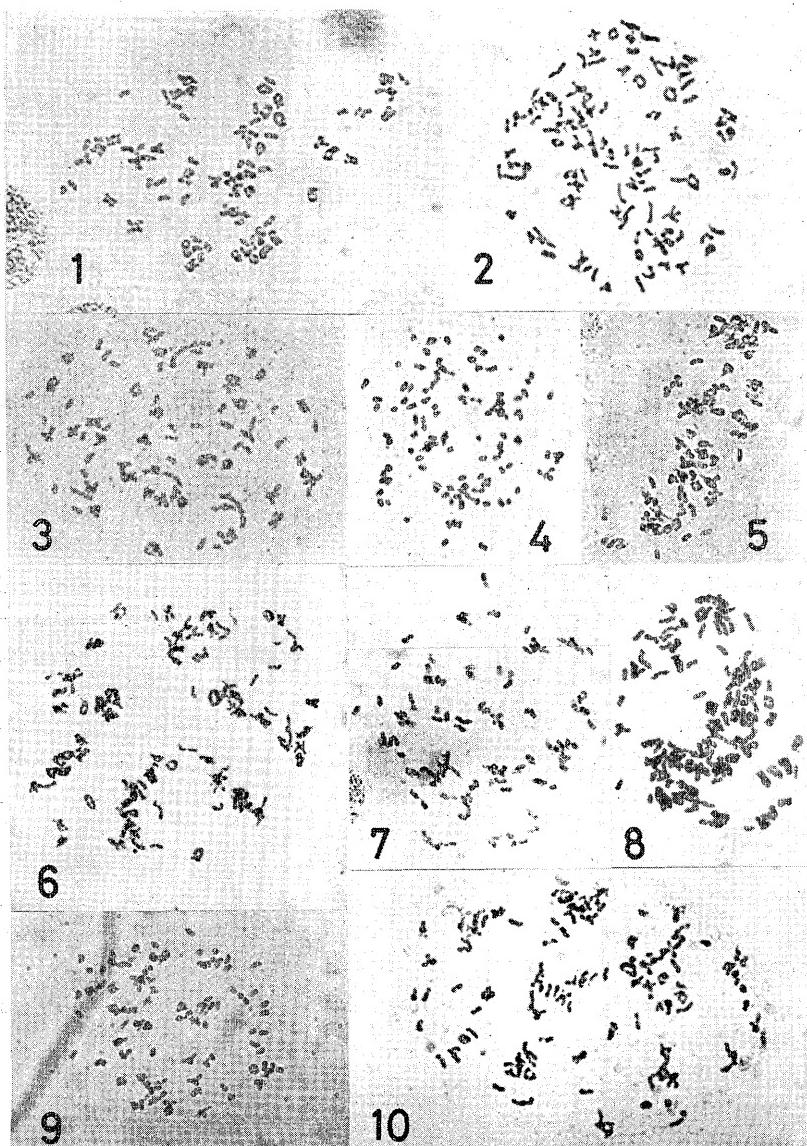
Polystichum × shintashiroi was reported by Kurata (1962) as a hybrid between *P. microchlamys* ($n=82$) and *P. ovatopaleaceum* "var. *coraiense*" ($n=82$). It may be easily confused with a hybrid between *P. microchlamys* and *P. retrosopaleaceum* ($n=41$) as pointed out by Kurata (1964). The specimen used in this study can be considered to be a hybrid between *P. microchlamys* and *P. retrosopaleaceum* at least judging from the results yielded here, since it shows approximately 59 univalents and 32 bivalents, and total chromosome number is 123.

In three triploid hybrids, *P. × amboversum*, *P. × hitoyoshiense* and *P. miuranum*, a few trivalent-like chromosomes were observed at meiosis. However, the presence of multivalent chromosome is not confirmed at present.

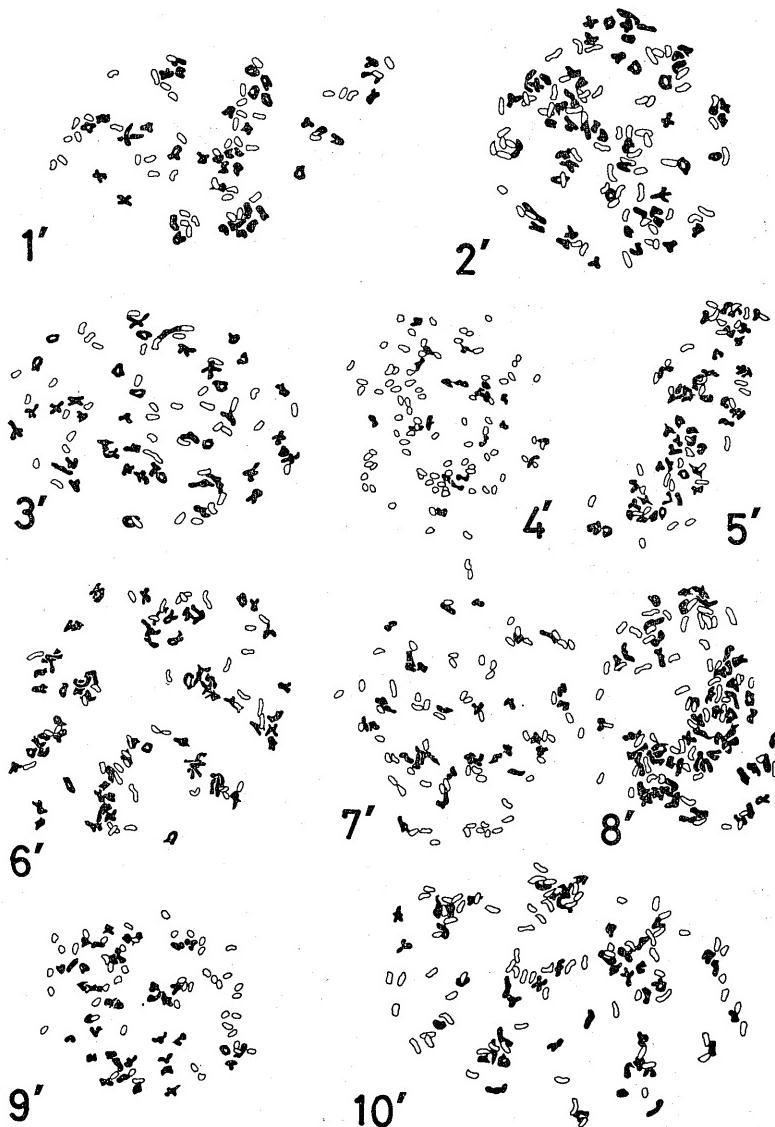
I would like to express my sincere thanks to Prof. Emer. Hiroshi Ito for his valuable advice.

References

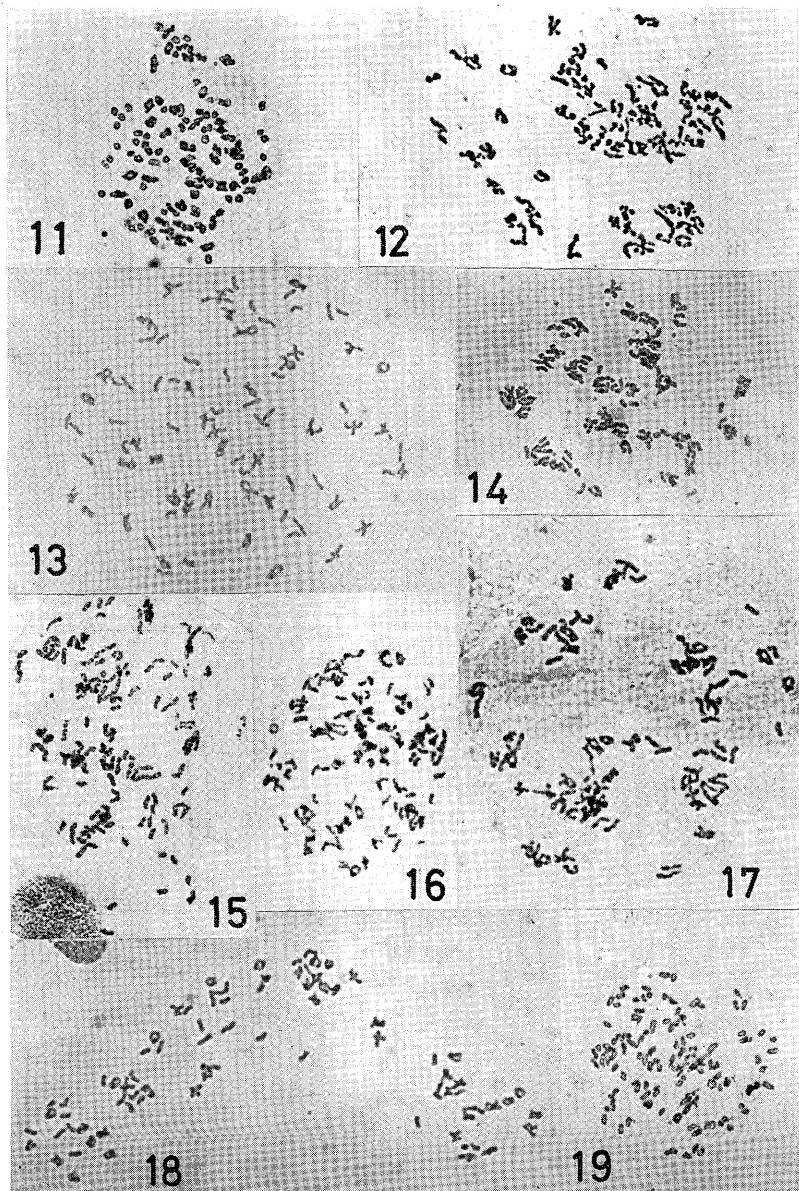
- Daigobo, S. 1973. Journ. Jap. Bot. 48: 337-343. Kurata, S. 1960. Journ. Geobot. 11: 6. — 1962. ibid. 11: 38. — 1964. Sci. Rep. Yokosuka City Mus. No. 10: 17-41. — 1969. ibid. No. 15: 44-48. Mitui, K.



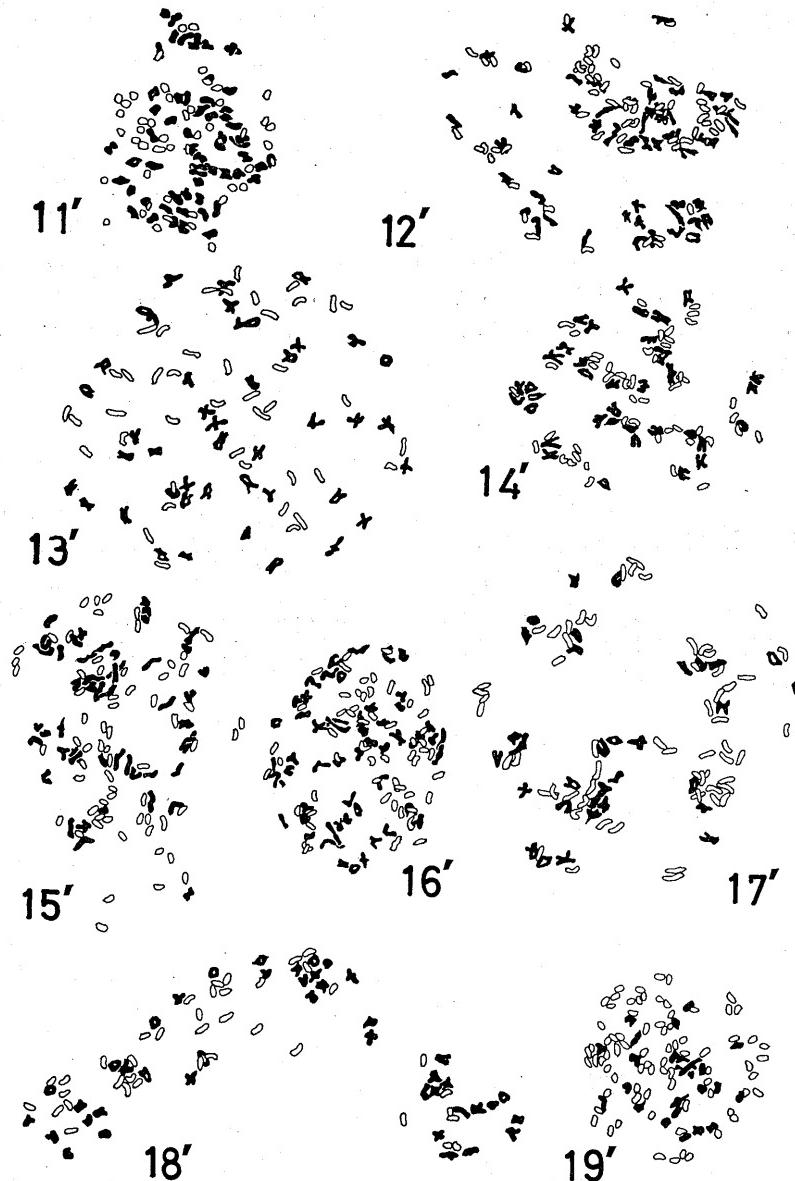
Figs. 1-10. Chromosomes of hybrids of *Polystichum* ($\times 630$). Names of hybrids are shown under corresponding numbers in Table I.



Figs. 1'-10'. Explanatory diagrams of chromosomes corresponding figures shown on p. 374.



Figs. 11-19. Chromosomes of hybrids of *Polystichum* ($\times 630$). Names of hybrids are shown under corresponding numbers in Table 1.



Figs. 11'-19'. Explanatory diagrams of chromosomes corresponding figures shown on p. 376.

1968. Sci. Rep. Tokyo Kyoiku Daigaku. Sec. B. 13(203): 285-333.

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イノデ属の自然雜種19種の染色体数を報告する。ミウライノデ、オオタニイノデの2種は3倍体雜種としてすでに報告されている（三井, 1964）が、他の17雜種については、今回あらたにその雜種性が細胞学的に確認された。表1と図1-19に示されるように、ハコネイノデ、カタイノデモドキ、キヨズミイノデ、カタホソイノデ、アカメイノデ、アマギイノデ、オングタイノデ、ミツイシイノデは4倍体雜種であり、アイヅヤナシイノデ、ヒトヨシイノデ、ホクリクイノデ、フナコシイノデ、ジタロウイノデ、ダントウイノデ、ミウライノデ、オオタニイノデ、シロウマイノデ、オオイノデモドキ、ハリマイノデは3倍体雜種である。

□杉本順一：日本草本植物総検索誌、II. 単子葉篇 pp. 630 井上書店 ¥4,800 (1973年11月) これで樹木篇、双子葉篇、シダ篇と4冊が揃った。各科毎に、さらに各属毎に検索表を添え、種属誌には学名、和名、英名、分布、花期、利用、染色体数、図のある文献を掲げた。出来る限り圧縮し、要領よく組んである。自生以外に栽培のものも大半は加えてあるので便利である。ことにラン科は栽培のものが46ページも加わっている。著者永年の御努力に謝意を表する。
(前川文夫)